

Oct. 13, 1953

C. D. CUPP

2,655,150

BREATHING APPARATUS

Filed March 8, 1951

2 Sheets-Sheet 1

Fig. 1.

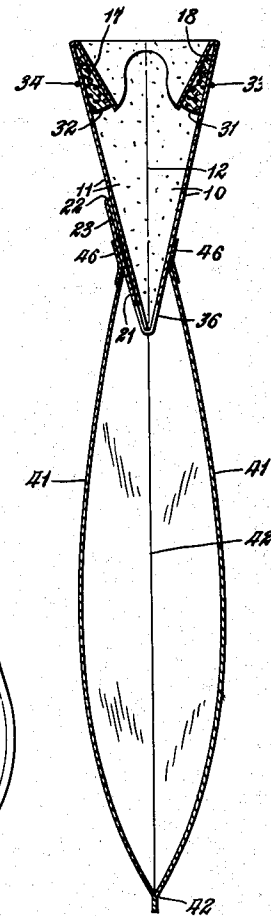
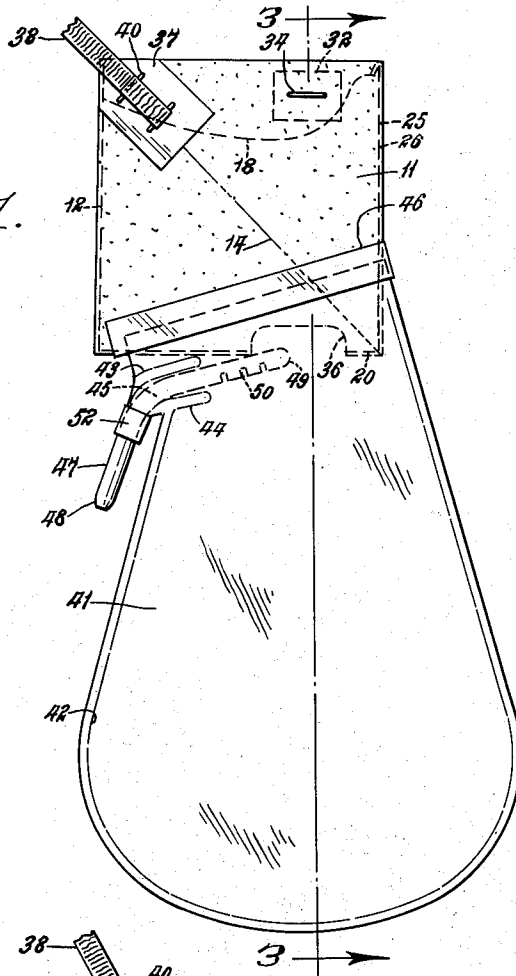
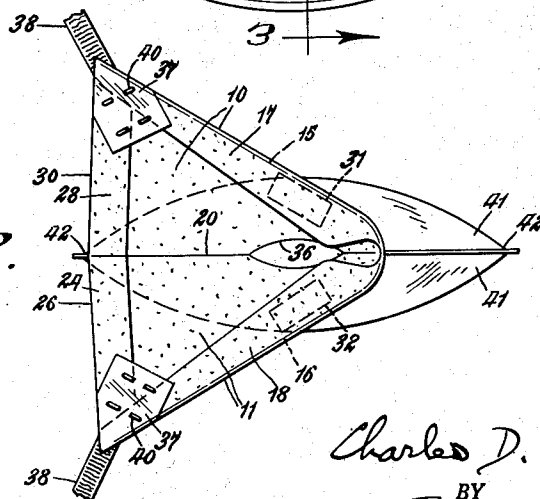


Fig. 3

Fig. 2.



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Fig. 4.

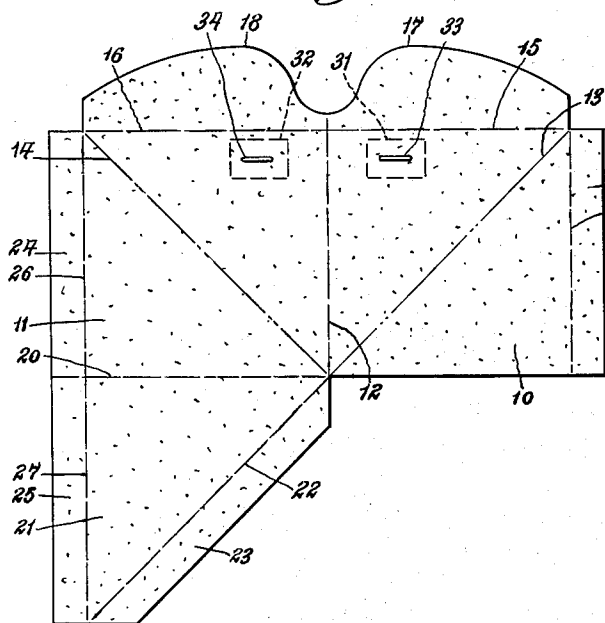


Fig. 5.

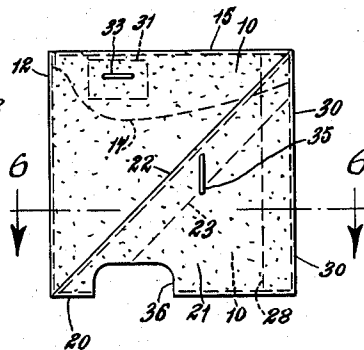


Fig. 6.

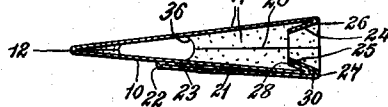


Fig. 7.

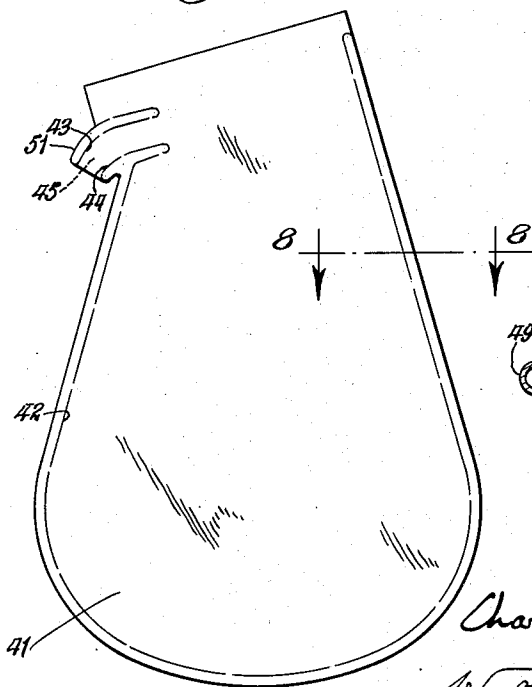


Fig. 8.

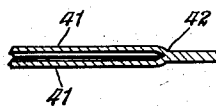
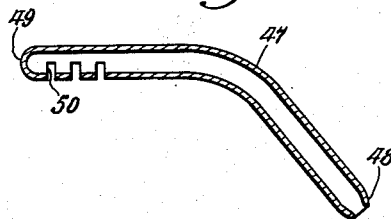


Fig. 9.



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UNITED STATES PATENT OFFICE

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BREATHING APPARATUS

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3 Claims. (Cl. 128—146)

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This invention relates, in its simplest form, to a breathing mask constructed of porous material, so as to allow ambient air to pass into the mask, and also to allow exhaled air to be discharged from the mask without requiring an exhalation valve for this purpose. In its more complex form, the invention relates to a porous, oronasal mask, tubularly connected to a flexible, but inelastic, rebreather bag supplied by compressed oxygen or air.

The invention relates more particularly to what is known as an individual, disposable mask and rebreather bag, i. e., to a breathing apparatus constructed so inexpensively that it may be provided brand new to any individual passenger of an air liner and then discarded after it has been used by this passenger.

The principal object of the invention is to provide a breathing apparatus of this character which, though low in cost, performs its functions completely and efficiently, including the diluting of the compressed oxygen or air by ambient air near the end of the inhalation cycle. Other collateral objects of the invention and practical solutions thereof are described in the following specification and appended drawings, wherein:

Fig. 1 is a side elevation of the invention in its most complex form.

Fig. 2 is a top plan thereof.

Fig. 3 is a vertical section thereof, taken on line 3—3, Fig. 1.

Fig. 4 is a layout blank of the main body of the mask prior to being folded and fastened together and secured to its head band and rebreather bag.

Fig. 5 is a side elevation of this main mask body folded and fastened together, and also edge punched so as to provide a fluid-transfer opening for tubularly connecting said mask with the rebreather bag.

Fig. 6 is a horizontal section through the partial assembly of Fig. 5, taken on line 6—6, Fig. 5.

Fig. 7 is a side elevation of the rebreather bag prior to its assembly with the mask and prior to being provided with a breathing-fluid inlet tube.

Fig. 8 is a fragmentary, enlarged, horizontal section through said rebreather bag taken on line 8—8, Fig. 7.

Fig. 9 is a vertical, longitudinal, enlarged section through the inlet tube.

Similar characters of reference indicate like parts in the several figures of the drawings.

The mask

The blank from which the main body of the

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mask is made is shown in flat, layout position in Fig. 4. This main body consists primarily of two squares, or other rectangular, side pieces—a left side piece 10 and a right side piece 11, connected integrally together at the front fold 12. These side pieces are constructed of impregnated, porous paper (such as crinkle-crepe paper or filter paper) and are diagonally creased at 13 and 14, for reasons subsequently to be explained. The upper edges of these side pieces 10 and 11 are integrally connected by folds 15 and 16, with companion curvilinear pieces 17 and 18.

Secured integrally by fold 20, to the lower edge of side piece 11 is a triangular, stiffening piece 21, which latter is integrally connected, by a fold 22, with a hem 23. Similar hems 24 and 25 are integrally connected by folds 26 and 27 with the rear edge of the right, rectangular side piece 11 and the rear edge of the triangular, stiffening piece 21 respectively. A hem 28 is also integrally connected by fold 30 with the rear edge of the left, rectangular side piece 10.

Before folding this main mask body together, a pair of left and right nose, spacer-blocks 31 and 32 are secured to the rectangular side pieces 10 and 11 of the mask by suitable staples 33 and 34, or otherwise. These nose spacer-blocks may be constructed of any inexpensive spongy material, such as soft felt or sponge rubber.

This main mask body of Fig. 4 is then folded together, as shown in Fig. 5, and is held together by a staple 35, after the curvilinear top pieces 17 and 18 have been first folded down over the nose spacer-blocks 31, 32, and then all of the four hems being turned in so as to form smooth, strong exposed edges.

The result of this assembly operation is a mask which may be used as it is; for instance, as a simple dust mask. If, however, it is desired to provide a breathing apparatus provided with a rebreather bag to be provided with a supply of breathing fluid, such as compressed oxygen or air, this assembly is edge-punched or "nibbled out" at its lower, forward edge to form an opening 36.

To conveniently hold the mask in place against the wearer's face, the mask is preferably reinforced at its upper rear corners by reinforcing adhesive tape 37, and a flexible, head band 38 suitably secured at its opposite end thereto by staple 40.

The rebreather bag

The rebreather bag, prior to assembly, is shown in Figs. 7 and 8. It consists of a pair of identically cut plastic sheets 41 (sheets of poly-

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ethylene or the like) which are connected together, at their edges, by a thermal-pressure seam 42, and, at their upper rear portion, by parallel seams 43 and 44 to form an annular inlet duct 45. It will be noted that all of these seams are semi-circular at all of their termini, so as to minimize the possibility of starting to tear at these points as a consequence of excessive localized tearing pressures. It is also to be noted that this bag, constructed of inexpensive plastic sheets, is flexible and expansible, but is not stretchable, such stretchable bags as those heretofore made of rubber, having been found to be unnecessary.

The entire assembly

This rebreather bag is connected to the mask, by two strips of adhesive tape 46, to form a relatively air and oxygen tight joint between the bag and the mask. Into the inlet duct 45 is passed an L-shaped, inlet tube 47 which is preferably constructed of some such clear plastic tubing and is slightly tapered at its outer end at 48 (to enable it to be smoothly inserted into a rubber tube) by a rotating fixture, and is more or less completely sealed off at its inner end 49, also by a rotating fixture. The lower face of the inner end of the tube 47 is suitably milled out to form a plurality of oxygen inlet ducts 50. The adjacent, protruding portion 51 of the rebreather bag is first wrapped around the neck of said inlet tube 47, and is then held in place by an annular band or ring 52 of adhesive tape.

The entire assembly (Fig. 1) is given to the air flight passenger compactly folded up in an aseptic, sealed envelope. Upon receiving this he tears it open, unfolds the mask and the rebreather bag, attaches the inlet tube 47 to a rubber tube (not shown) which is adapted to supply oxygen or air under pressure, and then fits the mask to his face, suitably arranging the head band 33 so as to fairly snugly hold the mask in place. The folds 13 and 14 of the mask enable said mask to easily open up into a cornucopia form so as to comfortably cover the nose and mouth of the wearer in a relatively tight fluid sealed relationship. The relative tightness of this seal is considerably increased by the spongy, nose, spacer blocks 31, 32 which serve to push inwardly the curvilinear pieces 17, 18 into firm but comfortable contact with the sides of the wearer's nose.

The inward flow of compressed oxygen thru the inlet tube 47 causes the rebreather bag to become more or less inflated, so as to make available an ample supply of oxygen, with a minimum of resistance, when the wearer starts to inhale, the oxygen passing up thru the opening 36 into the interior of the mask. When the lungs become substantially filled with oxygen, the re-

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breather bag becomes partially collapsed and restricted and then ambient air starts to pass inwardly thru the porous walls of the mask so as to fill the wearer's trachea with more air and less oxygen. On exhalation, the exhaled air passes out thru the porous walls of the mask, the rebreather bag in the meantime becoming filled with oxygen from the inlet tube 47.

It should be particularly noted that all of the component parts of this entire breathing apparatus are not only inexpensive to manufacture, and hence may be disposed of with very little loss, but also that these parts are all readily and completely combustible (even the staples may be made of plastic), and hence easily and conveniently disposed of.

I claim:

1. A breathing apparatus of the character described comprising: a mask consisting of two rectangular pieces of porous material connected together at their forward and lower edges, and folded over at their rear edges to form hems; and means for holding said mask against the face of the wearer.

2. A breathing apparatus of the character described comprising: a mask consisting of two rectangular pieces of porous material connected together at their forward and lower edges; and a triangular stiffening piece integrally connected with one of said rectangular pieces and overlying and secured to a portion of the other of said rectangular pieces; and means for holding said mask against the face of the wearer.

3. A breathing apparatus of the character described comprising: a mask consisting of two rectangular pieces of diagonally-creased, porous material connected together at their forward and lower edges; and a triangular stiffening piece integrally connected with one of said rectangular pieces and overlying and extending to the crease of the other of said rectangular pieces; and means for holding said mask against the face of the wearer.

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